

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings of claims in the application.

Listing of Claims:

Claims 1-44 (Cancelled)

Claim 45 (Original): A thermosetting composition comprising:

(a) a first reactant comprising functional groups;
(b) a crosslinking agent having at least two functional groups that are reactive with the functional groups first reactant in (a); and

(c) a copolymer flow control agent comprising a copolymer comprised of at least 30 mol % of segments comprising alternating residues derived from a donor monomer selected from the group consisting of isobutylene, diisobutylene, dipentene and isoprenol, and an ethylenically unsaturated acceptor monomer, wherein said copolymer is substantially free of maleate-type monomer segments and fumarate-type monomer segments and the copolymer flow control agent is substantially free of Lewis acids and transition metals.

46 (Original): The thermosetting composition of claim 45, wherein said copolymer has a number average molecular weight of from 500 to 20,000.

Claim 47 (Currently Amended): The thermosetting composition of claim 45, wherein said copolymer flow control agent is present in an amount of from 0.01 percent by weight

to 20 percent by weight, based on the total resin solids weight of said ~~coating~~ thermosetting composition.

48 (Original): The thermosetting composition of claim 45, wherein said thermosetting composition is a liquid.

49 (Original): The thermosetting composition of claim 45, wherein said thermosetting composition is a solid in particulate form.

50 (Original): The thermosetting composition of claim 45, wherein the functional groups of the first reactant (a) are selected from the group consisting of epoxy, carboxylic acid, hydroxy, amide, oxazoline, aceto acetate, isocyanate, methylol, methylol ether and carbamate, and the functional groups of crosslinking agent (b) are reactable with those in the first reactant (a), and are selected from the group consisting of epoxy, carboxylic acid, hydroxy, isocyanate, capped isocyanate, amine, methylol, methylol ether, and beta-hydroxyalkylamide.

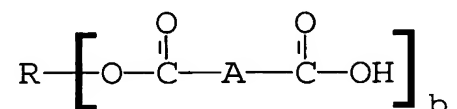
51 (Original): The thermosetting composition of claim 50, wherein said first reactant is selected from carboxylic acid functional polymers, and said crosslinking agent is a beta-hydroxyalkylamide functional crosslinking agent.

52 (Original): The thermosetting composition of claim 50, wherein said first reactant is selected from hydroxy functional polymers, and said crosslinking agent is a capped isocyanate functional crosslinking agent.

53 (Original): The thermosetting composition of claim 50, wherein said first reactant is selected from acid functional polyesters and said crosslinking agent is selected from glycidyl isocyanurates and bisphenol A epoxides.

54 (Original): The thermosetting composition of claim 50, wherein said first reactant is selected from epoxide functional polymers and said crosslinking agent is a carboxylic acid functional crosslinking agent.

55 (Original): The thermosetting composition of claim 54, wherein said first reactant is an epoxide functional acrylic or methacrylic polymer, and said carboxylic acid functional crosslinking agent is selected from the group consisting of dodecanedioic acid, azelaic acid, adipic acid, 1,6-hexanedioic acid, succinic acid, pimelic acid, sebacic acid, maleic acid, citric acid, itaconic acid, aconitic acid, carboxylic acid functional crosslinking agents represented by the following general formula:



wherein R is the residue of a polyol, A is a divalent linking group having from 2 to 10 carbon atoms, and b is an integer of from 2 to 10, and mixtures of such carboxylic acid functional crosslinking agents.

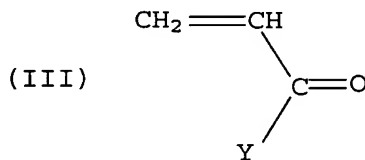
56 (Original): The thermosetting composition of claim 55, wherein said polyol from which R is derived is selected from the group consisting of ethylene glycol,

di(ethylene glycol), trimethylolethane, trimethylolpropane, pentaerythritol, di-trimethylolpropane and di-pentaerythritol, A is selected from the group consisting of 1,2-cyclohexylene and 4-methyl-1,2-cyclohexylene, and b is an integer of from 2 to 6.

57 (Original): The thermosetting composition of claim 45, wherein the copolymer comprises up to 10 mol % of donor monomers selected from the group consisting of styrene, substituted styrenes, methyl styrene, substituted styrenes, vinyl ethers, vinyl pyridine, and mixtures thereof.

58 (Original): The thermosetting composition of claim 45, wherein the copolymer comprises up to 25 mol % of acrylonitrile.

Claim 59 (Currently Amended): The thermosetting composition of claim 45, wherein the ethylenically unsaturated acceptor monomer is one or more described by structure (III):

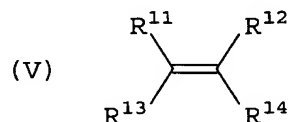


wherein Y is selected from the group consisting of -
NR³₂, -O-R⁵-O-C(=O)-NR³₂, and -OR⁴, R³ is selected from the group consisting of H, linear or branched C₁ to C₂₀ alkyl, and linear or branched C₁ to C₂₀ alkylol, R⁴ is selected from the group consisting of H, poly(ethylene oxide), poly(propylene oxide), linear or branched C₁ to C₂₀ alkyl, alkylol, aryl, alkaryl and aralkyl, linear or branched C₁ to C₂₀ fluoroalkyl, fluoroaryl and fluoroaralkyl, a siloxane radical, a polysiloxane radical,

an alkyl siloxane radical, an ethoxylated trimethylsilyl siloxane radical and a propoxylated trimethylsilyl siloxane radical, and R^5 is a divalent linear or branched C_1 to C_{20} alkyl linking group.

Claim 60 (Currently Amended): The thermosetting composition of claim 45, wherein the ethylenically unsaturated acceptor monomer is one or more selected from the group consisting methyl acrylate, ethyl acrylate, butyl acrylate, isobutyl acrylate, isobornyl acrylate, 2-ethylhexyl acrylate, perfluoroalkyl ethyl acrylates wherein the perfluoroalkyl group contains 4-20 carbon atoms, benzyl ether acrylates of a C_9 - C_{10} partially fluorinated alcohol, acrylate esters of a C_9 - C_{10} partially fluorinated alcohol, acryloxyalkyl terminated polydimethylsiloxane radicals, acryloxyalkyl tris(trimethylsiloxo silanes), acryloxyalkyl trimethylsiloxo terminated polyethylene oxide, chlorotrifluoro ethylene, glycidyl acrylate, 2-ethylhexyl acrylate, and n-butoxy methyl acrylamide.

61 (Original): The thermosetting composition of claim 45, wherein the copolymer comprises one or more residues derived from other ethylenically unsaturated monomers of general formula V:



wherein R^{11} , R^{12} , and R^{14} are independently selected from the group consisting of H, CF_3 , straight or branched alkyl of 1 to

20 carbon atoms, aryl, unsaturated straight or branched alkenyl or alkynyl of 2 to 10 carbon atoms, unsaturated straight or branched alkenyl of 2 to 6 carbon atoms substituted with a halogen, C₃-C₈ cycloalkyl, heterocyclyl and phenyl, R¹³ is selected from the group consisting of H, C₁-C₆ alkyl, COOR¹⁵, wherein R¹⁵ is selected from the group consisting of H, an alkali metal, a C₁ to C₆ alkyl group, glycidyl and aryl.

62 (Original): The thermosetting composition of claim 61, wherein the other ethylenically unsaturated monomers are one or more selected from the group consisting of methacrylic monomers and allylic monomers.

63 (Withdrawn): A method of coating a substrate comprising:

(A) applying a thermosetting composition to the substrate;

(B) coalescing said thermosetting composition to form a substantially continuous film; and

(C) curing the thermosetting composition, wherein the thermosetting composition comprises:

(i) A first reactant containing one or more functional groups;

(ii) a crosslinking agent having at least two functional groups that are reactive with the functional groups of the first reactant in (a); and

(iii) a copolymer flow control agent comprising a copolymer comprised of at least 30 mol % of segments

comprising alternating residues derived from a donor monomer selected from the group consisting of isobutylene, diisobutylene, dipentene, isoprenol, and mixtures thereof, and an ethylenically unsaturated acceptor monomer, wherein said copolymer is substantially free of maleate-type monomer segments and fumarate-type monomer segments and said copolymer flow control agent is substantially free of Lewis acids and transition metals.

64 (Withdrawn): The method of claim 63, wherein said copolymer has a number average molecular weight of from 500 to 20,000.

65 (Withdrawn): The method of claim 63, wherein said copolymer flow control agent is present in said thermosetting composition in an amount of from 0.01 percent by weight to 20 percent by weight, based on the total resin solids weight of said thermosetting composition.

66 (Withdrawn): The method of claim 63, wherein the functional groups of the first reactant (i) are selected from the group consisting of epoxy, oxirane, carboxylic acid, hydroxy, amide, oxazoline, aceto acetate, isocyanate, methylol, methylol ether and carbamate, and the functional groups of crosslinking agent (ii) are reactable with those in the first reactant (i) and are selected from the group consisting of epoxy, oxirane, carboxylic acid, hydroxy, polyol, isocyanate, capped isocyanate, amine, aminoplast, methylol, methylol ether, and beta-hydroxyalkylamide.

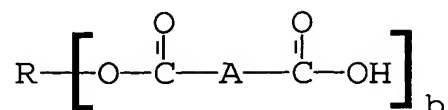
67 (Withdrawn): The method of claim 66, wherein said first reactant (i) is selected from carboxylic acid functional polymers and said crosslinking agent (ii) is a beta-hydroxyalkylamide functional crosslinking agent.

68 (Withdrawn): The method of claim 66, wherein said first reactant (i) is selected from hydroxy functional polymers and said crosslinking agent (ii) is a capped isocyanate functional crosslinking agent.

69 (Withdrawn): The method of claim 66, wherein said first reactant (i) is selected from acid functional polyesters and said crosslinking agent (ii) is selected from glycidyl isocyanurates and bisphenol A epoxides.

70 (Withdrawn): The method of claim 66, wherein said first reactant (i) is selected from epoxide functional polymers and said crosslinking agent (ii) is a carboxylic acid functional crosslinking agent.

71 (Withdrawn): The method of claim 66, wherein said first reactant is an epoxide functional selected from acrylic polymers, methacrylic polymers, and mixtures thereof, and said carboxylic acid functional crosslinking agent is one or more selected from the group consisting of dodecanedioic acid, azelaic acid, adipic acid, 1,6-hexanedioic acid, succinic acid, pimelic acid, sebacic acid, maleic acid, citric acid, itaconic acid, aconitic acid, carboxylic acid functional crosslinking agents represented by the following general formula:



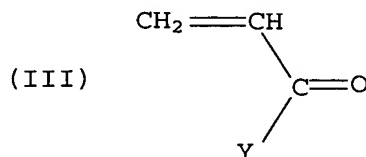
wherein R is the residue of a polyol, A is a divalent linking group having from 2 to 10 carbon atoms, and b is an integer of from 2 to 10.

72 (Withdrawn): The method of claim 71, wherein said polyol from which R is derived is selected from the group consisting of ethylene glycol, di(ethylene glycol), trimethylolethane, trimethylolpropane, pentaerythritol, di-trimethylolpropane and di-pentaerythritol, A is selected from the group consisting of 1,2-cyclohexylene and 4-methyl-1,2-cyclohexylene, and b is an integer of from 2 to 6.

73 (Withdrawn): The method of claim 63, wherein the copolymer further comprises up to 10 mol % of donor monomers selected from the group consisting of styrene, substituted styrenes, methyl styrene, substituted styrenes, vinyl ethers, vinyl pyridine, and mixtures thereof.

74 (Withdrawn): The method of claim 63, wherein the copolymer further comprises up to 25 mol % of acrylonitrile.

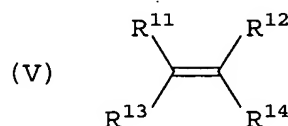
75 (Withdrawn): The method of claim 63, wherein the ethylenically unsaturated acceptor monomer is one or more described by structure (III):



wherein Y is selected from the group consisting of $-NR^3_2$, $-O-R^5-O-C(=O)-NR^3_2$, and $-OR^4$, R^3 is selected from the group consisting of H, linear or branched C_1 to C_{20} alkyl, and linear or branched C_1 to C_{20} alkylol, R^4 is selected from the group consisting of H, poly(ethylene oxide), poly(propylene oxide), linear or branched C_1 to C_{20} alkyl, alkylol, aryl, alkaryl and aralkyl, linear or branched C_1 to C_{20} fluoroalkyl, fluoroaryl and fluoroaralkyl, a siloxane radical, a polysiloxane radical, an alkyl siloxane radical, an ethoxylated trimethylsilyl siloxane radical and a propoxylated trimethylsilyl siloxane radical, and R^5 is a divalent linear or branched C_1 to C_{20} alkyl linking group.

76 (Withdrawn): The method of claim 63, wherein the ethylenically unsaturated acceptor monomer is one or more selected from the group consisting of hydroxyethyl acrylate, hydroxypropyl acrylate, methyl acrylate, ethyl acrylate, butyl acrylate, isobutyl acrylate, isobornyl acrylate, 2-ethylhexyl acrylate, perfluoroalkyl ethyl acrylates wherein the perfluoroalkyl group contains 4 to 20 carbon atoms, benzyl ether acrylates of a C_9 - C_{10} partially fluorinated alcohol, acrylate esters of a C_9 - C_{10} partially fluorinated alcohol, acryloxyalkyl terminated polydimethylsiloxane radicals, acryloxyalkyl tris(trimethylsiloxy silanes), acryloxyalkyl trimethylsiloxy terminated polyethylene oxide, chlorotrifluoro ethylene, glycidyl acrylate, 2-ethylhexyl acrylate, and n-butoxy methyl acrylamide.

77 (Withdrawn): The method of claim 63, wherein the copolymer comprises one or more residues derived from other ethylenically unsaturated monomers of general formula V:



wherein R¹¹, R¹², and R¹⁴ are independently selected from the group consisting of H, CF₃, straight or branched alkyl of 1 to 20 carbon atoms, aryl, unsaturated straight or branched alkenyl or alkynyl of 2 to 10 carbon atoms, unsaturated straight or branched alkenyl of 2 to 6 carbon atoms substituted with a halogen, C₃-C₈ cycloalkyl, heterocyclyl and phenyl, R¹³ is selected from the group consisting of H, C₁-C₆ alkyl, COOR¹⁵, wherein R¹⁵ is selected from the group consisting of H, an alkali metal, a C₁ to C₆ alkyl group, glycidyl and aryl.

78 (Withdrawn): The method of claim 77, wherein the other ethylenically unsaturated monomers are one or more selected from the group consisting of methacrylic monomers and allylic monomers.

79 (Withdrawn): The method of claim 63, wherein the thermosetting composition is a liquid.

80 (Withdrawn): The method of claim 63, wherein the thermosetting composition is a solid in particulate mixture form.

81 (Withdrawn): A substrate coated by the method of claim 63.

82 (Withdrawn): A substrate coated by the method of claim 79.

83 (Withdrawn): A substrate coated by the method of claim 80.

84 (Original): The thermosetting composition of claim 45, wherein said thermosetting composition includes a resinous phase dispersed in an aqueous medium, said resinous phase comprising (a), (b), and (c).

85 (Withdrawn): A method of electrocoating a conductive substrate serving as an electrode in an electrical circuit comprising said electrode and a counter electrode, said electrode and counter electrode being immersed in an aqueous electrocoating composition, comprising passing electric current between said electrode and counter electrode to cause deposition of the electrocoating composition on the substrate as a substantially continuous film, the aqueous electrocoating composition comprising:

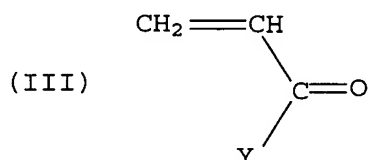
(a) an ungelled polymer containing one or more active hydrogen groups and one or more salt groups or groups which can be converted to salt groups;

(b) a curing agent having at least two functional groups which are reactive with the functional groups of (a); and

(c) a copolymer flow control agent comprising a copolymer comprised of at least 30 mol % of segments comprising alternating residues derived from a donor monomer selected from the group consisting of isobutylene,

diisobutylene, dipentene and isoprenol, and an ethylenically unsaturated acceptor monomer, wherein said copolymer is substantially free of maleate-type monomer segments and fumarate-type monomer segments and the copolymer flow control agent is substantially free of Lewis acids and transition metals.

86 (Withdrawn): The method of claim 85, wherein the ethylenically unsaturated acceptor composition in (C) is one or more acrylic monomers described by structure (III):



wherein Y is selected from the group consisting of $-\text{NR}^3_2$, $-\text{O}-\text{R}^5-\text{O}-\text{C}(=\text{O})-\text{NR}^3_2$, and $-\text{OR}^4$, R^3 is selected from the group consisting of H, linear or branched C_1 to C_{20} alkyl, and linear or branched C_1 to C_{20} alkylol, R^4 is selected from the group consisting of H, poly(ethylene oxide), poly(propylene oxide), glycidyl, linear or branched C_1 to C_{20} alkyl, alkylol, aryl, alkaryl and aralkyl, linear or branched C_1 to C_{20} fluoroalkyl, fluoroaryl and fluoroaralkyl, a siloxane radical, a polysiloxane radical, an alkyl siloxane radical, an ethoxylated trimethylsilyl siloxane radical and a propoxylated trimethylsilyl siloxane radical, and R^5 is a divalent linear or branched C_1 to C_{20} alkyl linking group.

87 (Withdrawn): The method claim 85, wherein the active hydrogen groups in the ungelled polymer of (a) are functional groups selected from the group consisting of

carboxylic acid, hydroxy, methylol, amide, and carbamate and the functional groups of the curing agent (b) are reactive with the functional groups in the curing agent (b), and wherein the functional groups of the curing agent (b) are selected from the group consisting of epoxy, carboxylic acid, hydroxy, isocyanate, capped isocyanate, amine, methylol, methylol ether, and beta-hydroxyalkylamide.

88 (Withdrawn): The thermosetting composition of claim 87, wherein the functional groups of the ungelled copolymer are hydroxy and the functional groups of the curing agent (b) are a capped polyisocyanate, wherein the capping group of the capped polyisocyanate crosslinking agent is selected from the group consisting of hydroxy functional compounds, 1H-azoles, lactams, ketoximes, and mixtures thereof.

89 (Withdrawn): The method of claim 88, wherein the capping group is selected from the group consisting of phenol, p-hydroxy methylbenzoate, 1H-1,2,4-triazole, 1H-2,5-dimethyl pyrazole, 2-propanone oxime, 2-butanone oxime, cyclohexanone oxime, e-caprolactam, and mixtures thereof.

90 (Withdrawn): The method of claim 88, wherein the polyisocyanate of said capped polyisocyanate curing agent is selected from the group consisting of 1,6-hexamethylene diisocyanate, cyclohexane diisocyanate, α,α' -xylylene diisocyanate, $\alpha,\alpha,\alpha',\alpha'$ -tetramethylxylylene diisocyanate, 1-isocyanato-3,3,5-trimethyl-5-isocyanatomethylcyclohexane,

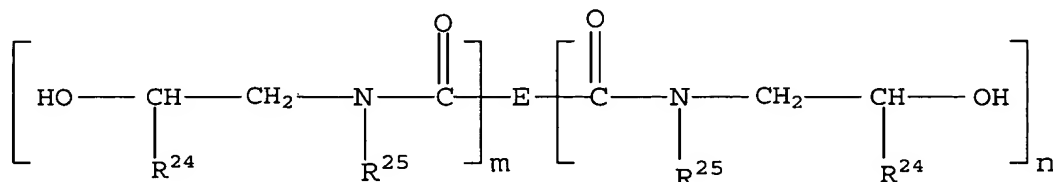
diisocyanato-dicyclohexylmethane, dimers of said polyisocyanates, trimers of said polyisocyanates, and mixtures thereof.

91 (Withdrawn): The method of claim 88, wherein the capped polyisocyanate curing agent is present in an amount of from 1 to 45 percent by weight, based on total weight of resin solids, and the hydroxy functional copolymer is present in an amount of from 55 to 99 percent by weight, based on total weight of resin solids.

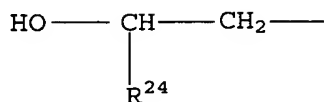
92 (Withdrawn): The method of claim 85, wherein the active hydrogen groups of the ungelled copolymer of (a) are carboxylic acid functional groups and the curing agent (b) is a beta-hydroxyalkylamide compound.

93 (Withdrawn): The method of claim 92, further comprising a second polycarboxylic acid functional material selected from the group consisting of C₄ to C₂₀ aliphatic carboxylic acids, polymeric polyanhydrides, polyesters, polyurethanes, and mixtures thereof.

94 (Withdrawn): The method of claim 92, wherein the beta-hydroxyalkylamide is represented by the following formula:



wherein R²⁴ is H or C₁-C₅ alkyl, R²⁵ is H, C₁-C₅ alkyl or



for which R^{24} is as described above, E is a chemical bond or monovalent or polyvalent organic radical derived from saturated, unsaturated, or aromatic hydrocarbon radicals including substituted hydrocarbon radicals containing from 2 to 20 carbon atoms, m is 1 or 2, n is from 0 to 2, and m+n is at least 2.

95 (Withdrawn): The method of claim 85, wherein the salt group in (a) is anionic or cationic.

96 (Withdrawn): The method of claim 85, wherein salt group in (a) is cationic and is selected from the group consisting of amine salt, quaternary ammonium, and ternary sulfonium.

97 (Withdrawn): The method of claim 85, wherein the salt group is derived from at least one epoxy group-containing monomer which after polymerization has been post-reacted with an amine salt or an amine and acid.

98 (Withdrawn): A substrate coated using the method of claim 85.